

Claims

- [c1] 1. A measurement system, comprising:
- a stage having a first piece and a second piece,
 - wherein at least one of said first piece and said second piece are movable with respect to one another;
 - a digital scale integrated in said first piece;
 - a detector integrated in said second piece at a position suitable to detect movement with respect to said digital scale and create a signal based upon relative movement between said digital scale and said detector; and
 - a display integrated in said second piece and suitable to receive said signal from said detector and display a reading of said relative movement.
- [c2] 2. The measurement system of claim 1, wherein said stage is a linear translation stage.
- [c3] 3. The measurement system of claim 1, wherein said stage is a member of the set consisting of rotary stages, gimbal mounts, and goniometers.
- [c4] 4. The measurement system of claim 1, wherein said stage is one of a plurality of stages and at least two said

stages include a same said first piece and share a same said digital scale.

- [c5] 5. The measurement system of claim 1, wherein said stage is one of a plurality of stages wherein respective said first pieces are collectively movable with respect to respective said second pieces along a single axis or multiple axes.
- [c6] 6. The measurement system of claim 5, wherein said second pieces of said plurality of stages each include a respective said detector and said display, thereby permitting measurement and display independently on each said stage.
- [c7] 7. The measurement system of claim 1, wherein said digital scale is in tape or disk form factor.
- [c8] 8. The measurement system of claim 1, wherein said stage moves linearly and said digital scale is in tape form factor and is mounted on a surface of said first piece along the axis of said relative movement.
- [c9] 9. The measurement system of claim 1, wherein said first piece moves rotationally and said digital scale is in tape form factor and is mounted on a surface of said first piece along a rotational arc of said relative movement.

- [c10] 10. The measurement system of claim 1, wherein said first piece moves rotationally and said digital scale is in tape form factor and is mounted on a surface of said first piece along a rotational arc of said relative movement.
- [c11] 11. The measurement system of claim 1, wherein said first piece moves rotationally and said digital scale is in disc form factor and is mounted co-axial with a rotational axis of said relative movement.
- [c12] 12. The measurement system of claim 1, wherein said digital scale has a characteristic detectable by said detector that is a member of the set consisting of magnetic, holographic, inductive, capacitive, optical hole patterns, and optical line patterns.
- [c13] 13. The measurement system of claim 1, wherein said detector tailors the signal using a member of the set consisting of filtration and amplification.
- [c14] 14. The measurement system of claim 1, wherein said detector converts said signal into a digital accumulative number of counts.
- [c15] 15. The translation measurement system of claim 1, wherein said display provides at least one function that is a member of the set consisting of position reset, posi-

tion preset, position difference between a reference position and a measured position, and conversion between units of measurement.

[c16] 16. The translation measurement system of claim 1, wherein:

said signal is a raw signal;
said display converts said raw signal to at least one display value and displays said display value; and
said display includes a port to communicate a result signal based on a said display value to a computerized outside system.

[c17] 17. The translation measurement system of claim 1, further comprising a microprocessor that processes said signal from said detector before said display displays said reading.

[c18] 18. The translation measurement system of claim 1, further comprising a power source for powering at least one of said detector and said display.

[c19] 19. A measurement method, comprising the steps of:
(a) moving a least one of a first piece of a stage and a second piece of a stage with respect to one another;
(b) detecting movement of a digital scale integrated in said first piece with a detector integrated in said

second piece, thereby detecting relative movement between said digital scale and said detector;
(c) creating a signal based upon said relative movement;
(d) communicating said signal to a display integrated in said second piece; and
(e) displaying a reading of said relative movement on said display.

- [c20] 20. A measurement system, comprising:
means for moving a least one of a first piece of a stage and a second piece of a stage with respect to one another;
means for detecting movement of a digital scale
means integrated in said first piece with a detector
means integrated in said second piece, thereby detecting relative movement between said digital scale means and said detector means;
means for creating a signal based upon said relative movement;
means for communicating said signal to a display
means integrated in said second piece; and
means for displaying a reading of said relative movement on said display means.